

*MAZEL', A.G.*

135-12-3/17

AUTHOR: Mazel', A.G., Candidate of Technical Sciences, Rogova, Ye. M.,  
Engineer, and Marchenko, Yu.I., Engineer

TITLE: Evaluating the Metal Transfer in the Arc in Manual Welding by  
Means of Current and Arc Voltage Oscillograms (Ob otsenke pere-  
nosa metalla v duge pri ruchnoy svarke po ostsillogrammam toka  
i napryazheniya dugi)

PERIODICAL: Svarochnoye Proizvodstvo, 1957, # 12, p 9-12 (USSR)

ABSTRACT: The article gives the results of an experimental study of  
the metal transfer processes in bottom, vertical and ceiling  
position, with electrodes "УОНИ-13/45", "УП-2/45", "СМ-11", "СМ-5",  
"ИМ-7", "ЦНИЛСС-342", "ЦЦ-1" (experimental cellulose electrodes),  
"ВН-48" (CSR) and Fleetweld-5 (USA electrodes). A specially  
adapted "АДС-1000-1" automatic welder and an "МПО-2" oscillo-  
graph were used. Manual welding was also studied to find the  
influence of the welder's hand oscillations. The observations  
made are described in detail. The electrodes were supplied by  
LENZ ("ЛЭМЗ"), VNIISTroyneft', plant "Krasnyy Kotel'shchik",  
a Leningrad plant, and TsNIITMASH. One group of the studied  
electrodes produced 5 uniform short circuits per second, the

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MAZEL', Aleksandr Grigor'yevich, kand. tekhn. nauk; ROGOVA, Yelena  
Mikhaylovna, inzh.; MARCHENKO, Yuriy Ivanovich, inzh.;  
RAGAZINA, M.F., inzh., ved. red.; SHTERLING, S.Z., dots.,  
red.; PONOMAREVA, V.A., tekhn. red.

[Selection of electrodes for the welding of low-carbon steels]  
Vybór elektrodov dlia svarki malouglerodistykh stalei. Moskva,  
Filial Vses. in-ta nauchn. i tekhn. informatsii, 1958. 18 p.  
(Peredovoi nauchno-tekhnicheskii i proizvodstvennyi opyt. Tema 12.  
No.M-58-62/6) (MIRA 16:2)  
(Steel—Welding) (Electrodes)

AUTHORS: Mazel', A.G. and Burlakova, R.P. SOV 125-58-5-9/15

TITLE: "KVS-19" Ceramic Flux for Automatic and Semi-Automatic Welding of Low-Carbon Steel (Keramicheskii flyus KVS-19 avtomaticheskoy i poluavtomaticheskoy svarki malougleristy stali).

PERIODICAL: Avtomaticheskaya svarka, 1958, Nr 3, pp 62-68 (USSR)

ABSTRACT: In 1956, the VNIISTroyneft developed a new "KVS-19" flux with a higher resistance to rust pores than the "AN-348-A" and "OSTs-45" fluxes, which frequently do not ensure dense welded seams in assembling containers, pipelines and other structures in the oil and gas industry. This flux, ensuring good seam formation and resistance to cracks, has the following chemical composition: manganese ore - 54%, fluorite - 7%, quartz sand - 30%, ferrosilicon - 7%, aluminum powder - 2%. The basic component, increasing resistance against rust, is fluorite. Information includes data on the influence of individual components of this flux on its properties. Control tests were carried out at TsNIITMASH and at the Electric Welding Institute imeni Paton and showed good results. Tests under industrial conditions were performed at the Kuybyshev (KZMK), the Syzran' (SMU-6), the Shchekars (SMU-77) and the Rastorguyev (Stal'montazh Trust) Plants.

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SOV 125-58-3-9/15

"KVS-19" Ceramic Flux for Automatic and Semi-Automatic Welding of Low-Carbon Steel

The flux is produced by the electrode workshop at the Lyuberetskiy zavod montazhnykh zagotovok (**Lyubertsy Plant of Semi-finished Blanks**), together with VNIISTroyneft, which also manufactured the test flux. There are 4 tables, 4 graphs and 3 Soviet references.

ASSOCIATION: VNIISTroyneft'

SUBMITTED: June 6, 1957

- |                                |                                    |
|--------------------------------|------------------------------------|
| 1. Welding fluxes--Development | 2. Welding fluxes--Materials       |
| 3. Welding fluxes--Properties  | 4. Ceramic materials--Applications |

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135-58-7-11/70

AUTHOR: Mazel', A.G., Candidate of Technical Sciences, and Pogova, Ye.M.,  
Engineer

TITLE: On Rutile Electrodes (O rutilovyykh elektrodakh)

PERIODICAL: Svarochnoye proizvodstvo, 1958, Nr 7, pp 33-35 (USSR,

ABSTRACT: Rutile (natural titanium dioxide) from USSR deposits is compared with Australian rutile (Table 1), mostly used in foreign practice. VNIIST has proved the possibility of using USSR rutile for electrode coatings, and set up TU (technical specifications) for the rutile supply of electrode plants. The article contains information on the composition of new "VSP-50" electrodes, with rutile containing coatings, used for welding low-carbon, medium-carbon and low-alloy steels. Replacement of artificial titanium dioxide by rutile for SM-11 and ENTU-3 electrodes was successfully brought about by the Lyuberetskiy zavod montazhnykh zagotovok (Lyubertsy Plant for Pre-Assembled Units), together with VNIIST, and with the participation of A.S. Vitenberg and V.G. Khokhlov from LZMZ. There are 2 tables, 2 graphs and 3 references, 2 of which are Soviet and 1 German.

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' On Rutile Electrodes

135-55-7-11 '80

, ASSOCIATION: VNIIST

1. Rutile--Specifications 2. Welding electrodes--Coatings

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SV-135-55-11-5/11

AUTHORS: Fal'kevich, A.S. and Mazel', A.G., Candidates of Technical Sciences; Marchenko, Yu.I. and Mikhlin, I.I., Engineers

TITLE: Automatic Overhead Pipe Welding Under Flux (Avtomaticheskaya svarka pod flyusom trub v potolochnom polozenii)

PERIODICAL: Svarochnoye proizvodstvo, 1958, Nr 11, pp 10-13 (1958)

ABSTRACT: Information is presented on experimental data obtained by the welding laboratory at VNIIST in developing a new method of overhead welding (suggested by welding operator A. A. Koro-zov). It can be applied for the overhead welding of the first layer of carbon and low alloy steel pipes of 114 - 720 mm in diameter without support rings and with flux fed into the arc space by means of a worm. The main technological factors of the new method are the displacement of the electrode from the lowest point of the pipe and the force of pressure upon the flux pad. The method ensures a stable burning of the arc, and a satisfactory accumulation of the weld metal. Optimum welding parameters permit the obtaining of a 4 - 6 mm thick first layer with high mechanical properties. Special devices developed at VNIIST with the participation of engineers A. N. Karbachinskiy and M. I. Shlyuyev are used in the new method.

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Automatic Overhead Pipe Welding Under Flux

SOV-175-88-11-8 21

which is recommended for industrial purposes.

There are 6 tables, 1 diagram, 1 oscillogram, and 5 photos.

ASSOCIATION: VNIIST

1. Pipes—Arc welding
2. Arc welding—Equipment
3. Electric arcs—Performance

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25(1)

SOV/135-59-3-6/2:

AUTHOR: Mazel', A.G.

TITLE: New Electrodes and Fluxes for Welding Gas Mains and Oil Pipelines  
(Novyye elektrody i flyusy dlya svarki magistral'-nykh gazo-, nefteprovodov)

PERIODICAL: Svarochnoye proizvodstvo, 1959, Nr 3, pp 10-11 (USSR)

ABSTRACT: A new ceramic flux, "KVS-19" (Ref. 1), has been developed at VNIIST and authorized for use by Glavgas SSSR. It eliminates the deficiencies of the "UONI-13/55"-electrodes with "AN-348A"-flux that have been used in construction of pipe mains. This flux, reducing the rust and water sensitivity of welds in automatic welding process, will be produced at the imeni Zhdanov Plant in Leningrad. It will be mixed in sodium water glass (the composition is not given). The new special VNIIST-developed "VSR-50"-electrodes with basic-type coating with high rutile content (Ref. 2) were tested with good results in the Serpukhov-Leningrad gasline, and were accepted by Glavgas SSSR for gas and oil mains. These will also be produced at the imeni Zhdanov Plant. Canadian experience with the cellulose-coated electrodes ("Flitweld")

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SOV/135-52-3-0/24

New Electrodes and Fluxes for Welding Gas Mains and Oil Pipelines

and "Shieldarc") is discussed, with the remark that in the USSR the production of such electrodes is hampered by the lack of the necessary oxycellulose grades. The author, jointly with Ye.M. Rogova and L.I. Sorokin, suggested a new electrode type with a plastic coating containing an organic resin for a gas-forming and binding component eliminating the known disadvantages of water glass, requiring no scarce raw material and producing welds of equal quality with the American gas-shielding cellulose electrodes. Pipes, 1,020 mm in diameter, with thick walls, of new high-strength steel grades, will be extensively used for pipelines in the future. This requires the quick development of new fluxes and electrodes. The production of the first mentioned ceramic flux "KVS-19" and electrodes "BSR-50" at the Leningrad imeni Zhdanov Plant is being arranged by G.S. Golyashkin, V.V. Blagoveshchenskaya, Chief Mechanician D.G. Lupanov, Ye.A. Rudakova, and V.I. Sukhorukov.

ASSOCIATION: VNIIST

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18(5,7)  
AUTHORS:

SOV/135-59-8-5/24  
Mazel', A.G., Candidate of Technical Sciences, Burla-  
kova, R.P., Engineer, and Khrenov, K.K., Engineer

TITLE:

Research of Carbon - Dioxide Shielded Welding of Low-  
Carbon Steel With Sintering Powder

PERIODICAL:

Svarochnoye proizvodstvo, 1959, Nr 8, pp 15-17 (USSR)

ABSTRACT:

It is known that in welding with carbon-dioxide shield and with an electrode of 2mm and more a lot of metal is spilled. The spatters may close the jet of the burner, which makes it necessary to interrupt the welding frequently in order to clean the burner. The use of special nozzles and feeders with stiff constructions may solve the problem only partially. A complete removal of the spatters is possible by using carbon-dioxide shielded welding with thin electrode-wires of a thickness of 0.8-1 mm, a small precisely regulated electrode arm, and an arc voltage of at the most 17-20 V, which assures that the arc is very frequently short-circuited by the drops of metal. The welding in this case must be carried out by the feeder with a

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Research of Carbon-Dioxide Shielded Welding of Low-Carbon Steel  
With Sintering Powder

stiff characteristic and high dynamical qualities. If the electrode arm is thin, the welding can be carried out only with weak currents. Therefore, a wire of this sort is recommended for welding of thin metal parts. If the parts are thicker than 3-4 mm, thin wires are not very effective. The study which was done at the VNIIST shows, that the introduction of compounds which form slags into the welding zone is an effective way to remove the spatters in  $\text{CO}_2$ -shielded welding of large spots. The slag-shield must also add to clean the welding of non-metallic inclusions and to a better removal of the dissolved gases, which improves the plastic qualities in the molten metal. An important advantage of using slag-forming compounds is the fact that this makes it superfluous to use special welding wires. Quite reliable results are obtained with using unkilld steel. Welding with such wires and correspondingly composed slag-forming compounds assures solid seams. The introduction of

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Research of Carbon-Dioxide Shielded Welding of Low-Carbon Steel  
With Sintering Powder

slag-forming compounds is possible by several methods. The authors used the method of welding with sintering powder. The difference lies in the fact, that welding with sintering powder is not done in the air, but under a shield of CO<sub>2</sub>. A special apparatus was added to the welding transformer TS-17M (Figure 1) which is used for a simultaneous feeding of the gas and the powder. The powder, which contains iron powder, is magnetized and attracted by the wire as soon as it leaves the tank 1 and comes into the magnetic field caused by the welding current. The special sleeve 2 assures a definite thickness of the layer of flux on the wire. The permanent magnet 3 of the alloys "al'nisi" or "magniko" creates a magnetic field around the wire in case the welding is interrupted and thus prevents a spilling of the flux. The CO<sub>2</sub> enters the angular chamber 4 and the nozzle 5 through the gas pipe. The burner is cooled with water which flows through pipe 6. The welding was carried out with the wire of type

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Research of Carbon-Dioxide Shielded Welding of Low-Carbon Steel  
With Sintering Powder

Sv-08A which was 2 mm strong; the electrode had a positive pole with a current of 300-400 A, and the welding speed was 30 m/h. The CO<sub>2</sub> consumption was 1000 l/h. Source of current was the welder PS-500. In determining the composition of the sintering powder it had to be taken into consideration that it is supposed to alloy and modify the seam without forming a gas shield. The powder was produced in the same way as the material for the coats of the electrodes. Table 1 gives the compositions of the fluxes and their technological characteristics. Fluxes with differing proportions of FeTi, Fe, CaF<sub>2</sub>, and manganese ore were also produced. The compositions of the fluxes, their technological characteristics, and results of mechanical tests of the molten metal are given in table 2. The authors hope, that the development of a special apparatus for CO<sub>2</sub>-shielded welding with an injector for the sintering powder will make it possible in the near future to introduce a new method of welding.

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Research of Carbon-Dioxide Shielded Welding of Low-Carbon Steel  
With Sintering Powder

The authors come to the following conclusions: It is possible to reduce considerably the spattering of the metal if the combined welding method (sintering powder +  $\text{CO}_2$ ) is used instead of welding only with  $\text{CO}_2$ . It is not necessary in this case to use special welding rods. The welding can be carried out with common low-carbon welding rods. The seams are not porous in this method. The plasticity and solidity of the joints is satisfactory. It is necessary to perfect the mechanism feeding the sintering powder, because the use of an annular permanent magnet does not allow a proportioning of the powder. There are 2 tables, 1 diagram, 6 graphs and 4 references, 2 of which are Soviet and 2 English.

ASSOCIATION: VNIIST

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MAZEL', Aleksandr Grigor'yevich; ROGOVA, Yelena Mikhaylovna; SOROKIN, Lev Ivanovich; RAZUMOVSKAYA, T.Ya., red.; DEMIDOV, Ya.F., tekhn.red.

[Research on new electrodes for the welding of pipes and other structures made of low-carbon and low-alloy steels] Issledovanie novykh elektrodov dlia svarki truboprovodov i drugikh konstruktsii iz malouglerodistoi i niskolegirovannoi stali. Moskva, VNIIST Glavgaza SSSR, redaktsionno-izdatel'skii otdel, 1960. 30 p. (MIRA 14:11)

(Steel--Welding)



84698

S/135/60/000/005/005/009  
A115/A029

1.2300 2 208.2708 only

AUTHORS: Mazel', A.G., Candidate of Technical Sciences; Rogova, Ye M.,  
Sorokin, L.I.; - Engineers

TITLE: Electrodes with Plastic, Gas-Shielded Coating for Welding of Low-  
Carbon and Low-Alloyed Steels

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 5, pp. 25 - 28

TEXT: New electrodes with gas-shielded coating have been developed in the welding laboratory of the VNIIST. As binding and gas-producing component organic resins were used to substitute water glass. Production of electrodes proceeds in the following way: A dry layer of coating is soaked with diluted resin, stirred and applied under high pressure to a normal electrode wire. Drying and tempering is replaced by polymerization at 160 - 180°C for 20 - 40 min. The resin solidifies, becomes plastic, impervious to water and firmer than normal coatings. Various resins and varnishes were tried out, such as bakelite varnish, liquid bakelite, organic silicon 3Ф-5Т, 3Ф-8СУ, 3Ф-9 (EF-5Т, EF-BSU, FG-9) furan varnishes 4Ж-1, 4Ж-4 (FL-1, FL-4) were used as binding materials. Preference is given to bakelite.

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A115/A029

# Electrodes with Plastic, Gas-Shielded Coating for Welding of Low-Carbon and Low-Alloyed Steels

varnishes for their low price (Table 1). Over 200 different electrodes have been tested, containing marble, rutile, feldspar, fluorspar, martensite ore, hematite, talc, manganese, ferrosilicon, ferrotitanium, ferromolybdenum as well as admixtures of pulverized bakelite, colophony, calcinated soda, potash and starch. It has been proved by technological tests that with a high content of  $TiO_2$  thick slag is formed and on the surface blisters appear due to accumulation of gases under the slag. Addition of hematite and other oxides promotes slag dilution and better seam forming. Marble in the amount of over 10% promotes pore formation in the seams. Fluorspar prevents welding with alternating current. In the case of applying electrodes coated with organic varnishes, a reducing atmosphere appears in the arc due to a surplus of hydrogen and carbon. Bakelite resin  $[6C_6H_5(OH) \cdot 7CH(OH)]$  is superior to cellulose and starch  $(C_6H_{10}O_5)_n$ . The reducing property of bakelite resin is seen when comparing the chemical composition of metals fused with electrodes of the same composition on water glass and bakelite varnish (Table 2). The reducing property of bakelite resin promotes the passage of silicon into the seam (Fig. 1). The thickness of the coating on 4-mm rods has been

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Electrodes with Plastic, Gas-Shielded Coating for Welding of Low-Carbon and Low-Alloyed Steels

fixed with 0.6 - 0.65 mm. Figure 4 shows experimental data on the viscosity of bakelite varnishes in dependence on the quantity of the diluted resin. Figures 5 and 6 show the results of the extraction of the coating on a "Sakslet" apparatus after various exposures at 150°C. Electrodes put into the oven immediately after manufacture do not crack. Coefficients of fusion and losses with БСН-16 (VSP-1b) in comparison with electrodes 90HH-13/55 (UONI-13/55) and American Flitweld-5 cellulose electrodes (type B6010) are given in Table 3 and Figure 7. With reversed polarity VSP-1b, UONI-13/55 and Flitweld-5 run close, whereby the maximal coefficient of fusion has been achieved by VSP-1b. The gas analysis of metal welded with VSP-1b by hot extraction showed only 7.8 - 17.0 cm<sup>3</sup> of hydrogen in 100 g of seam. VSP-1b electrodes have been tested at field welding of pipe junctions, girders, etc. with d-c and a-c. The engineers A.S. Vitenberg, N.A. Keeles, M.Kh. Sedlovskiy and P.G. Terekhov took part in the work. There are 3 references 1 Soviet, 2 English.

Card 3/3

MAZEL', A.G., kand.tekhn.nauk

Effect of surface tension forces on metal transfer and loss  
coefficients in manual arc welding. Svar.proizv. no.8:  
14-15 Ag '60. (MIRA 13:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut tverdykh  
splavov.  
(Electric welding) (Surface tension)

21910

S/125/60/000/011/005/016  
A161/A133

1.2300 also 1573

AUTHORS: Mazel', A.G., Neyfel'd, I.Ye.

TITLE: Interaction of droplet, coating and base metal at the welding arc

PERIODICAL: Avtomaticheskaya svarka, no. 11, 1960, 25-30

TEXT: Phosphorus reactions were studied in welding with УОМН -13/45 (UONI-13/45) electrodes (basic coating) and УМ -7 (TsM-7) (acid coating), as well as the behaviour of molybdenum in welding with electrodes containing ferromolybdenum and coated with plastics. The arc current and voltage were oscillographed, and a high-speed relay switched off the current 10-15 sec after the beginning of welding. High-speed photo-camera records at the moment of switching off proved that a droplet stands still for 0.2-0.3 sec after the arc interruption; 0.25 sec was added to this time to determine the time of the droplet life, and the droplets were analyzed to determine the dependance of the droplet life time on the electrode end and the concentration of the alloy element added to the coating. A uniform distribution of the element

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S/125/60/000/011/005/016  
A161/A133

Interaction of droplet, coating...

in the droplets was found using an autoradiogram of the  $P^{32}$  isotope (Fig.2). In welding with basic electrode coating (UONI-13/45) the phosphorus concentration decreased in the growing droplet (Fig.3), but in welding with acid coating (TsM-7) the phosphorus content increased (Fig.4). The molybdenum transfer was studied by adding 4% FeMo into the plastic gas-shielded coating on C<sub>8</sub>-08A (Sv-08A) wire. The investigation results proved that the transfer of elements from the coating into the droplet may proceed in different ways; in the case of molybdenum, cases are possible when the Mo concentration will not change with time. No such equilibrium was found with phosphorus. A certain quantity of base metal may stick to the electrode end after the arc interruption, as was proved with chrome-nickel 18-8 steel. This is not important from the point of the chemical composition of the droplets, but it appears that the base metal can affect the exit of electrons from the droplet in the direct-polarity welding process, i.e., when the droplet is the cathode. It was observed that the wire melting rate was about 20% higher when oxides (scale or rust) were present on the base metal surface. A thin chalk coating leveled the wire melting rate. The effect of the base metal surface in welding with inverse polarity (i.e. the base metal being the cathode) was studied with steel specimens that had been pickled and cleaned with wire

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Interaction of droplet, coating...

brushes, coated with 0.05 mm copper, and with 0.05 mm nickel. The arc voltage was different and the weld shape coefficient (fusion depth/seam width ratio) varied (Fig.6), which is explained by the straying of the cathode spot. It appears that the weld shape may be controlled to a certain degree by changing the surface condition of the work, for instance in gas-shielded welding with consumable electrodes with inverse-polarity current. The effect of the surface condition is suppressed by the welding slags in welding with coated electrodes or with submerged arc. There are 6 figures and 3 Soviet references.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'stvu  
magistral'nykh truboprovodov. (All-Union Scientific Research  
Institute for the Construction of Main Pipelines)

SUBMITTED: March 14, 1960

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Interaction of droplet, coating...



Figure 2:

- a - addition of radioactive sulfur to the coating
- b - addition of radioactive iron

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A161/A133

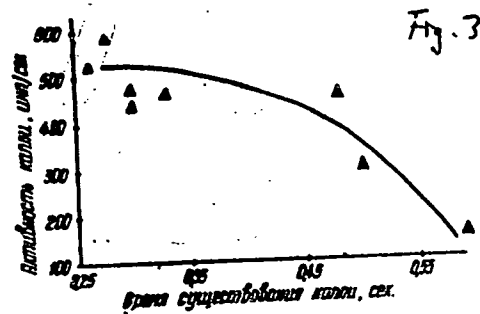


Figure 3:

Radioactivity of droplets with  $p^{32}$  in basic coating



Interaction of droplet, coating...

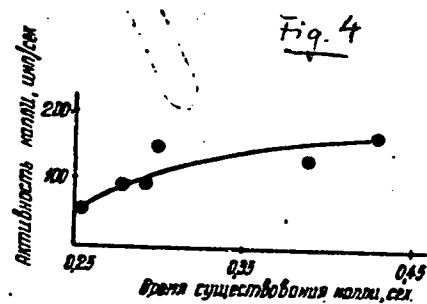


Figure 4:  
Radioactivity of droplets with  $P^{32}$  in acid coating

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A161/A133

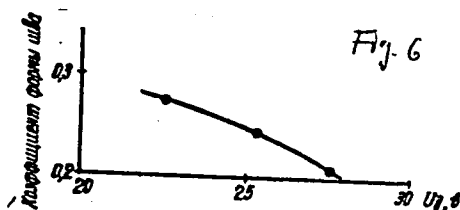


Figure 6:

Dependence of the weld shape coefficient ratio of fusing depth to width of seam on the arc voltage, varying because of the different state of base metal surface

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3-12-76/000/012/001/011-  
A161/A030

1.2300

AUTHOR: Mazel', A.G.

TITLE: On The Conductivity and Stability of the Welding Arc

PERIODICAL: Avtomaticheskaya svarka, 1960, No. 12, pp. 54 - 59

TEXT: Previous theoretical calculations (Ref. 1) and experiment data (Refs. 2,3) proved that ionizers always decrease the temperature in the arc. K.K. Khrenov (Ref. 1) found theoretically a dependence between the arc column temperature ( $T$  °K) and the potential of the arc gas ionization ( $V_i$ , volt):  $T = 810V_i$  (1) and G.B. Semenova (Ref. 2) stated an empirical relation:  $T = 600(V_i + 1.5)$  (2). Theoretical calculations explained the drop of voltage gradient in the arc on introducing fluorspar (active deionizer) (Ref. 4). Experiment data disproved the belief that haloid compound vapors have a deionizing effect in the arc plasma, for such compounds stabilize it despite intensive evaporation into the discharge space. Chemically pure and waterless  $PbCl_2$  coated on  $\varnothing 8$  (Sv-08A) welding wire stabilized the arc well, and  $BaCl_2$  and  $MgCl_2$  had the opposite effect. The stabilizing properties of some matters were judged by the breaking length of the arc, and the results of experiments (Table 2) show that marble, feldspar, dolomite and rutile are good ionizers, and ferrimanganese, ferrosilicon, fluorspar and quartz sand.

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3/125/60/000/012/007/014

A161/A030

On the Conductivity and Stability of the Welding Arc

strong deionizers. The deionizers reduce the breaking arc length and raise the arc tension; the ionizers do the opposite. The observed interdependence between the presence of ionizers, the nominal arc voltage, and the work function of electrons from the cathode shows that the stability of the arc is connected with the processes on the cathode and the conductivity in the cathode spot zone. It is possible that in the case of chlorine salts,  $\text{PrCl}_2$  improves the emission of electrons on the cathode, for this salt emits negative ions only when heated, i.e., the salt film on the cathode gets a positive charge, reducing the potential barrier on the cathode surface. If this is so, the effect of  $\text{MgCl}_2$  must be the opposite, for it emits positive ions only and develops a negative charge raising the potential barrier on the cathode.  $\text{BaCl}_2$  emits both positive and negative ions and has an intermediate effect on the arc stability. A strong effect of the state of the cathode on the stability of the arc in welding with alternating current had also been stated in (Ref. 7). It appears that the breaking length of the arc (that practically characterizes the stability) depends on the conductivity in the cathode zone. Conclusions: The effect of the electrode coating components on the stability of the welding arc is often produced not in the positive column but on the cathode. Ionizers may not improve the degree of the plasma ionization, but they considerably reduce the work function of electrons from the cathode, and

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On the Conductivity and Stability of the Welding Arc      S/125/60/000/012/007/014-  
Al61/A030

this raises the conductivity in the cathode space and makes the arc more stable. The further study of cathodes is expected to provide very valuable data for evaluating the technological properties of the welding arc. There are 3 figures and 8 Soviet references.

ASSOCIATION: VNIIST

SUBMITTED:    October 20, 1959

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2/201  
S/125/61/000, 001/0050-6  
A161/A133

1.2300

AUTHOR: Mazel', A.G.

TITLE: Metal transfer in manual arc welding

PERIODICAL: Avtomaticheskaya svarka, no. 1, 1961, 34 - 43

TEXT: The process of metal transfer has been studied at VNIIST with high-speed movie pictures (3,000 frames per second), using the shadow method. The CKC-1 (SKS-1) camera had a 300 mm objective focus and a red light filter. The arc current and voltage were oscillographed synchronously with the film, with a MPO-2 (MPO-2) oscillograph. Welding was performed with immobile electrode, onto plates moving with an automotive carriage at a speed of 10 m/hour. All wires (of different composition) were 4 mm in diameter. The film showed that, when the arc burned normally, the metal was transferred with a short circuit of the arc gap, and transfer by drops was only insignificant. The observed boiling of drops on the electrode end seemed to depend on the carbon and silicon content in the wire, i.e., the less Si and the more C in the wire, the more intense was the gas formation in

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A161/A133

Metal transfer in manual arc welding

the drop. A gas analysis at the experimental welding plant proved that wires with more intensely boiling drops contained more dissolved gas. Drops more saturated with gas contacted the molten pool surface more frequently and the number of short circuits slightly increased, while the fusion of the electrode slowed down, which is due to more disturbed convective flow carrying heat from the arc to the non-fused electrode with higher heat losses. Intenser drop boiling at slower electrode melting is due to a liberation of gas and oxidation of carbon. Various coatings were tried on the Cs-08A (Sv-08A) wire grade. Drops seen on the film assumed very different shapes, the neck formation between the drop and the electrode was only rare. This shows that the transfer cannot be explained by the pinch effect (as assumed by some authors). Drops flying from the pool to the electrode were also seen, and their speed was many times higher than of drops from the electrode to the pool. Reference is made to authors' own and other authors' works to illustrate the difference of opinions. Scientific staff members R.P. Burlakova and L.I. Sorokin took part in the experimental investigation. Conclusions: 1) In manual arc welding processes with optimum conditions metal is being transferred predominantly at short circuits. 2) The short circuit number

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22236  
S/125/61/000/001/005/016  
A161/A133

Metal transfer in manual arc welding

alone does not determine the electrode melting efficiency. 3) The frequency of short circuits in welding with bare electrode wire depends on the arc length, the chemical composition of the wire, and its saturation with gases. 4) Thin coatings have a considerable effect on the short circuit frequency. Coatings that raise the nominal arc voltage decrease the short circuits number due to increasing forces that are repelling the drop from the pool surface. 5) Drops are being repelled mainly by the reaction forces forming at eruptions of vapors and gases out of drops, and by vapor pressure during the ruptures of necks. Boiling of the pool and pressure of the arc are also posing short circuits. 6) Vapors and gases are moving the drop towards the workpiece during their formation inside the drop. Gravity and pinch-effect do not perceptibly affect the metal transfer. There are 5 figures, 9 Soviet-bloc and 10 non-Soviet-bloc references. The four most recent English-language references read as follows: L.I. Larson, Metal Transfer in the Metallic Arc, "The Welding Journal", No.2, v.21, 1942; W. Spraragen and B.A. Lengyel, Arc Physical Aspects and Metal Transfer in Arc Welding, "The Welding Journal", No.1, v.22, 1943; R.C. Mc.Master, D.C. Martin and A. Leatherman, Analysis of the material transfer in arc welding, "The Welding Journal", No. 12, v.28, 1949; R.C. Waugh and O.P. Eberlein, Factors influencing the pene-

Card 3/4

Metal transfer in manual arc welding

22236  
S/125/61/000/001/005/016  
A161/A133

tration in metal-arc welding, "The Welding Journal", No.6, v.33, 1954. ✓

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'stvu  
magistral'nykh truboprovodov (All-Union Scientific Research  
Institute for the Construction of Main Pipelines)

SUBMITTED: October 29, 1959

Card 4/4



VORNOVITSKIY, I.N., inzh.; ZASKO, F.A., inzh.; MAZEL', A.G., kand.tekhn.  
nauk

VSTS-1 gas-protecting electrodes for rapid welding of pipelines  
without using backing rings. Stroil. truboprov. 6 no. 1:28-30  
Ja '61. (MIRA 14:2)

(Pipelines--Welding)

(Electrodes)

8/193/61/000/008/003/007  
A004/A101

AUTHORS: Mazel', A.G., Candidate of Technical Sciences, Rogova, Ye.M.,  
Sorokin, L.I.

TITLE: Welding electrodes with plastic coating

PERIODICAL: Byulleten' tekhniko-ekonomicheskoy informatsii, no. 8, 1961, 26-27

TEXT: The authors of the article, scientific workers of the Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'stvu magistral'nykh truboprovodov (All-Union Scientific Research Institute for the Construction of Main Pipelines) (VNIIST), have developed the BCN-18 (VSP-1b) and BCN-2 (VSP-2) electrodes with plastic coating intended for the welding of low-carbon and low-alloyed steels. The VSP-1b electrode can be used for either d-c or a-c welding, while the VSP-2 electrode operates on d-c of reversed polarity. Electrodes with plastic coating ensure an improved transition of alloying elements and carbon in the weld due to the reducing action of the gases during the burning of bakelite lacquer. The bakelite lacquer produces a gas shield protecting the arc from the surrounding air; moreover it creates a direct relationship between the lacquer quantity used in the mix and the carbon content in the weld metal. One of the main ways

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AS

... results, ... biological properties.

Card 1/2 ... issledovatel'skiy institut po stroitel'stvu  
... an truboprovodov (All-Union Scientific Research  
... itute for the Construction of Main Pipelines) (VNIIST)

Card 2/2

Welding electrodes with plastic coating

S/193/61/000/008/003/007  
A004/A101

of reducing the weld porosity during the welding with plastic-coated low-carbon or low-alloyed steel electrodes is to decrease the carbon content of the weld, therefore it should be avoided to add strong reducers to the coating mixture. By reducing the carbon, hydrogen and manganese content the sensitivity of the built-up metal to hot cracks can be decreased. The large-scale production of VSP-1b electrodes is carried out at the Lyuberetskiy zavod montazhnykh zagotovok Glavneftemontazha (Lyubertsy Plant of Assembly Materials of Glavneftemontazh) and at the Ramenskiy mekhanichskiy zavod (Ramensk Mechanical Plant) of "Glavstal'-konstruktsiya". The VSP-2 electrodes are produced at the Moskovskiy elektrodnyy zavod (Moscow Electrode Plant) of the Moscow Sovnarkhoz. The fabrication technology of plastic-coated electrodes remains essentially the same as that of water-glass-coated electrodes. The coating is polymerized at 130-140°C in the course of 40-45 minutes. The most important advantage of plastic-coated electrodes is their complete moisture-proofness. After having been stored in water for one month the electrodes have not changed their welding and technological properties. Radiographic investigations have shown satisfactory results.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'stvu magnistral'nykh truboprovodov (All-Union Scientific Research Institute for the Construction of Main Pipelines) (VNIIST)

Card 2/2

S/125/61/000/012/001 008  
D040/D112

AUTHORS: Mazel', A.G.; Rogova, Ye.M.; Sorokin, L.I.

TITLE: The alloying of the weld metal during welding with electrodes  
with a plastic coating

PERIODICAL: Avtomaticheskaya svarka, no. 12, 1961, 28-33

TEXT: The authors describe the effect of a plastic coating, developed at VNIIST for welding electrodes, on the transfer of separate alloying elements from the coating into the weld metal, as well as the effect of the individual ferroalloys in the coating on the properties of the weld. The plastic coating has been previously described (Ref.1: A.G. Mazel', Ye.M. Rogova and L.I. Sorokin, "Svarochnoye proizvodstvo", no.5, 1960; Ref.2: Ye.M. Rogova, "Svarochnoye proizvodstvo", no.8, 1960). It was found that coefficient of transfer of the alloying elements from the plastic coating was higher than from conventional coatings prepared with water glass. In the experiments, ferromanganese, ferrosilicon, ferrotitanium, ferromolybdenum and powder aluminum were introduced in gradually increasing quantities into the coating mixture, which contained bakelite resin, hematite, rutile, perovskite, kaolin, ferromanga-

Card 1/2

S/125/61/000/012/004/008  
D040/D112

The alloying of the weld ...

nese, ferrotitanium and slab silicate. The observed strengthening effect of separate ferroalloys is discussed and illustrated in graphs. The effect of increased amounts of FeTi on the properties of the weld metal could not be evaluated when aluminum was simultaneously added, because of the resultant excessive porosity of the metal. Electrodes with a high content of Mo in the coating, produced welds with an ultimate strength of above 90 kg/mm<sup>2</sup> and satisfactory elongation and toughness. Conclusions: (1) Plastic coatings ensure more effective transfer of the alloying elements into the welds than coatings prepared with water glass, which means that the consumption of scarce ferroalloys may be cut. (2) The mechanical properties of the weld metal can be regulated over a wide range owing to the high transfer of alloying elements. The strengthening effect of molybdenum is of particular interest. (3) In connection with the possibility of obtaining welds with a high carbon content, and the high transfer of alloying elements, electrodes with a plastic coating may be employed for surfacing. There are 3 figures and 3 Soviet references.

ASSOCIATION: VNIIST

SUBMITTED: March 27, 1961

Card 2/2

MAZEL', A.G., kand.tekhn.nauk; ROGOVA, Ye.M., inzh.; SOROKIN, L.I., inzh.

New metallurgical characteristics of electrodes with plastic coverings. Svar.proizv. no.1:10-12 Ja '62. (MIRA 15:3)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut tverdykh splavov.

(Electrodes)

S/135/62/000/002/002/C10  
A006/A101

AUTHORS: Vornovitskiy, I.N., Engineer, Mazel', A.G., Candidate of Technical Sciences

TITLE: Investigation of electrodes with gas-shielded cellulose coating

PERIODICAL: Svarochnoye proizvodstvo, no. 2, 1962, 12 - 14

TEXT: To determine the possibility of developing gas-shielded cellulose coating with a high amount of 3H (ETs) cellulose, tests were made with experimental electrodes. Ten layers were built up to determine the chemical composition and gas saturation of the built-up metal and plates were welded to establish the mechanical properties. Changes in the chemical composition of the built-up metal were determined as a function of the cellulose-manganese-ore ratio and the cellulose-hematite ratio in the coating and the calcination temperature of cellulose. It was found that the minimum level of ETs cellulose, at a weight factor of the coating of about 20%, should be 25-30% to assure reliable gas shielding of the welding pool against the effect of air. Cellulose is not the source for the saturation of the weld metal with carbon, at a correctly selected composition of the coating and 120°C electrode roasting temperature. Then the carbon concn-

Card 1/2

Investigation of electrodes ...

S/135/62/000/002/002.CIC  
A006/A101

tration in the built up metal can be assured within 0.08 - 0.12%. An increase of the roasting temperature over 120 - 150°C may entail a higher carbon content and impair the quality of the built-up metal. There are 4 tables, 4 figures and 4 references: 1 Soviet-bloc and 3 non-Soviet-bloc.

ASSOCIATION: VNIIST

Card 2/2



MAZEL', A.G., kand.tekhn.nauk; BURLAKOVA, R.P., inzh.

Use of inside centering clamps in assembling and stationary  
welding of joints. Stroi. truboprov. 7 no.7:6-10 JI '62.

(MIRA 15:7)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut po  
stroitel'stvu magistral'nykh truboprovodov, Moskva.  
(Pipe joints)

MAZEL', A.G.; VORNOVITSKIY, I.N.; TARLINSKIY, V.D.

Effect of heat generation in the arc on metal melting during welding. Avtom. svar. 15 no.12:32-40 D '62. (MIRA 16:2)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'stvu magistral'nykh truboprovodov.  
(Electric welding) (Heat--Transmission)

MAZEL', A.G., kand. tekhn. nauk

Technological properties of welding arcs. Trudy VNIIST  
no.13:3-95 '62. (MIRA 16:11)

VORNOVITSKIY, I.N., inzh.; MAZEL', A.G., kand. tekhn. nauk; ZASKO, F.A.,  
inzh.; BLAGOVESHCHENSKAYA, V.V., inzh.

The VSTs-1 cellulose-coated electrodes for the welding of pipe-  
lines. Svar. proizvod. no.3:18-20 Mr '64. (MIRA 18:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'stvu  
magistral'nykh truboprovodov (for Vornovitskiy, Mazel').
2. Gosudarstvennyy proizvodstvennyy komitet po gazovoy promyshlen-  
nosti SSSR (for Zasko). 3. Leningradskiy zavod im Zhdanova (for  
Blagoveshchenskaya).

MAZEL', A.G.

Raising the tempo in welding and assembly operations. Stroi. truboprov.  
10 no.1:33 Ja '65. (MIRA 18:4)

1. Rukovoditel' sektora laboratorii svarki Vsesoyuznogo nauchno-  
issledovatel'skogo instituta no stroitel'stvm magistral'nykh  
truboprovodov

VORNOVITSKIY, I.N., inzh.; MAZEL' A.G., kand. tekhn. nauk; SBARSKAYA, N.P.,  
inzh.

Calculated method of determining the quantity of electrode  
coatings for arc welding. Svar. proizv. no.4s10-12 Ap '65.  
(MIRA 18:6)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut po stroitel'-  
stvu magistral'nykh truboprovodov.

L 44421-66 EWT(m)/EWP(w)/EWP(v)/T/EWP(t)/ETI/EP(k) IJP(c) JD/HM/HW

ACC NR: AP6019826 /A) SOURCE CODE: UR/0095/66/000/002/0016/0019

AUTHOR: Mazel', A. G.; Rogova, Ye. M.; Poluz'yan, Zh. A.

ORG: none

TITLE: Efficiency of pipeline welds made at low temperature

SOURCE: Stroitel'stvo turboprovodov, no. 2, 1966, 16-19

TOPIC TAGS: pipeline, pipe, pipeline welding/UONI-13/55 electrode, /15G2S steel, 10G2SB steel

ABSTRACT: The authors analyze in detail the effects of welding at subzero temperatures on the efficiency of pipeline welds. Modern pipeline steels contain a large amount of manganese, silicon and, occasionally, carbon, which pass from the parent metal into the weld. The influence of the above elements on the efficiency of welds at low temperatures was studied, using 15G2S and 10G2SB steel pipes. The chemical content of the pipeline steels is shown in a table presented in the original article. Experiments were made using both manual and

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UDC: 621.643.411.4

L 44421-66

ACC NR: AP6019826

2

automatic shielded arc welding. It was found that the use of UONI-13/55-type electrodes to weld pipelines at temperatures ranging from +20° to 50°C ensured a high notch toughness of the weld metal. The nil-ductility transition temperature was found to be below -80C. In automatic welding, the increase of carbon content in the welding wire and of the phosphorus in the flux produce an adverse effect by decreasing the notch toughness and the nil-ductility transition temperature. The authors emphasize the need of careful controls of the welding wire and flux. When pipelines are welded at sub-zero temperatures, a preliminary or simultaneous heating does not increase the notch toughness of the weld metal. The need for preliminary heating, is determined by conditions in which cracks and other defects appear in the weld. Orig. art. has: 5 figures and 3 tables. 16 [GC]

SUB CODE: 20, 13, 09/ SUBM DATE: none/

Card 2/2



KISLYUK, F.I., doktor tekhnicheskikh nauk; MAZEL', A.T. kandidat tekhnicheskikh nauk; FAL'KEVICH, A.S. inzhener; ANUCHKIN, M.S., kandidat tekhnicheskikh nauk; LIVSHITS, L.S. kandidat tekhnicheskikh nauk; BEYFEL'D, I.Ye., inzhener; BAKHRAKH, L.P., inzhener; POLYAKOVA, P.B., inzhener.

Welding with electrode cluster. Section of the All-Union Scientific Engineering Technological Association of Welders in the All-Union Scientific Research Institute for Petroleum Industry Construction. Avtog. delo 24  
no.6:30 Je '53. (MLRA 6:5)

(Electric welding)

MAZEL', G.Ya., inzhener.

Source: KGB Archives

Slag concrete brick factory. Mekh.stroi. 4 no.8:21-22 Ag '47.  
(MLRA 9:2)

1.Trest "Stroymekhmontazh".  
(Brick industry)

5(3)  
**AUTHORS:** Topchiyev, A. V., Academician, SOV/20-125-5-26/61  
 Alaniya, V. P., Mazel', I. S.

**TITLE:** Polymerization of  $\beta$ -Nitrostyrene (Polimerizatsiya  
 $\beta$ -nitrostirola)

**PERIODICAL:** Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 5,  
 pp 1048-1050 (USSR)

**ABSTRACT:** The investigation of the reaction mentioned in the title is interesting in connection with the problems with which research workers are faced in search of new monomers and methods of their polymerization. The reaction mentioned is interesting as well from a theoretical point of view since  $\beta$ -nitrostyrene belongs, according to its structure, to the compounds which are not easily polymerized and yields only dimers. This may explain the fact that no papers on this topic have hitherto been published (except Ref 1). After the polymerization has taken place the authors added chloroform to the reaction product in which a part of the product dissolved, the residue remaining as a precipitate. The latter was dried and treated with ethanol in which it dissolved partly. From the analysis

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Polymerization of  $\beta$ -Nitrostyrene

SOV/20-125-5-26/61

of the chloroform- and ethanol extracts it followed that  $\beta$ -nitrostyrene, which did not enter reaction, was extracted by chloroform, whereas the alcohol absorbed a trimer of this styrene. The precipitate - a white amorphous powder - , which dissolved neither in chloroform nor in ethanol, was the polymer of  $\beta$ -nitrostyrene. In this reaction the influence of several catalysts was tested. Sodium malonic ester was effective, sodium methylate, however, was the most effective catalyst. The yield of polymers was investigated in dependence of temperature, the quantity of the catalyst, and the duration (Figs a, b, c).  $-10^{\circ}$  was the optimum temperature (yield 98 %), the optimum catalyst quantity amounted to 4.7 % with respect to the monomer duration 10 - 12 hours. Up to 6 % trimers were produced besides the polymer. In conclusion, the solubility of the polymer, its melting point, and the thermomechanical curve (Fig 2) were discussed. The radiograph (Fig 4) shows that the structure of the polymer is similar to that of polystyrene. There are 3 figures and 2 references, 1 of which is Soviet.

December 19, 1958

SUBMITTED:  
Card 2/2

MAZEL', I.S.

PHASE I BOOK EXPLOITATION

SOV/4984

International symposium on macromolecular chemistry. Moscow, 1960.

Mezhdunarodnyy simpozium po makromolekulyarnoy khimii SSSR, Moskva, 14-18 iyunya 1960 g.; doklady i avtoreferaty. Sektsiya III. (International Symposium on Macromolecular Chemistry Held in Moscow, June 14-18, 1960; Papers and Summaries) Section III. [Moscow, Izd-vo AN SSSR, 1960] 469 p. 55,000 copies printed.

Tech. Ed.: P. S. Kashina.

Sponsoring Agency: The International Union of Pure and Applied Chemistry. Commission on Macromolecular Chemistry.

PURPOSE: This book is intended for chemists interested in polymerization reactions and the synthesis of high molecular compounds.

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International Symposium (Cont.)

SOV/4984

1  
**COVERAGE:** This is Section III of a multivolume work containing papers on macromolecular chemistry. The articles in general deal with the kinetics of polymerization reactions, the synthesis of special-purpose polymers, e.g., ion exchange resins, semiconductor materials, etc., methods of catalyzing polymerization reactions, properties and chemical interactions of high molecular materials, and the effects of various factors on polymerization and the degradation of high molecular compounds. No personalities are mentioned. References given follow the articles.

**TABLE OF CONTENTS:**

Smets, G., and W. De Loecker (Belgium). Reaction Kinetics and Tacticity of Macromolecules

5

Loucheux, M. H., and A. Banderet (France). A Purely Chemical Contribution to the Knowledge of the Shape of Macromolecules in Solution

13

Card 2/13

International Symposium (Cont.)

SOV/4984

- Kudryavtsev, G. I., Ye. A. Vasil'yeva-Sokolova, and I. S. Mazel' (USSR). The Interaction of Poly- $\alpha$ -chloromethylacrylate With Amines 24
- Rabek, T. I., and J. Kosmider (Poland). Chlorination of Phenol-Formaldehyde Resins 27
- Alexandru, L., M. Opris, and A. Ciocanel (Rumania). Cyanoethyl and Aminopropyl Ethers of Polyvinyl Alcohol 34
- Yakubovich, A. Ya., G. Ya. Gordon, L. I. Maslenikova, Ye. M. Grobman, K. I. Tret'yakova, and N. I. Kokoreva (USSR). Study of the Chemical Conversions of Polycarbonates 44
- Parrod, J., and A. Kohler (France). Study of Macromolecular Clathrate Compounds 54
- Dogadkin, B. A., M. S. Fel'dshteyn, and E. N. Belyayeva (USSR). Chemical Interaction and Mechanism of the Activating Action of Double Systems of Vulcanization Accelerators 65

Card 3/13

44272

S/190/63/005/001/020/020  
B117/B186

5 3833  
AUTHORS:

Kudryavtsev, G. I., Vasil'yeva-Sokolova, Ye. A., Mazel', I.S.

TITLE:

Synthesis of polymers based on 2,6-lutidine and aromatic dialdehydes

PERIODICAL: Vysokomolekulyarnyye soyedineniya, v. 5, no. 1, 1963, 151-152

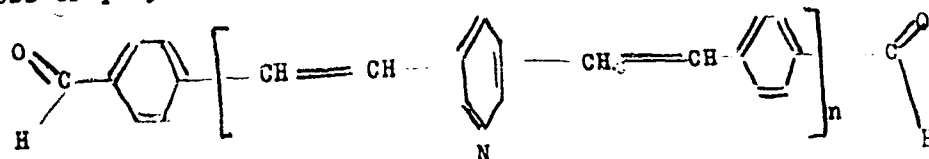
TEXT: A new method of synthesizing thermostable polymers is the polycondensation of lutidine and N-methyl lutidine iodide with aromatic dialdehydes. An infusible, light-brown powder soluble in acids and in some organic solvents (quinoline, cresol, benzyl alcohol) was produced from equimolecular amounts of lutidine and terephthalaldehyde by heating (160-220°C) in the presence of  $ZnCl_2$ . The specific viscosity of a 0.5% solution of the polymer in sulfuric acid is 0.103. The molecular weight determined according to Rast is 1800-2300. The following structure was found for the polymer from infrared spectra and elementary analyses:

Card 1/3



Synthesis of polymers based on ...

S/190/63/005/001/020/020  
B117/B186



Its heat resistance is seen from the following data: Heating of the sample at 300°C (5 hrs) in air leads to a loss in weight of 7.25%; at 400°C (3 hrs) the loss in weight is 14.70%; heating at 400°C (3 hrs) in nitrogen leads to a loss in weight of 7.28%. Infusible, dark-brown powders were produced by heating (70-90°C in absolute alcohol) of N-methyl lutidine iodide with aromatic dialdehydes (terephthal isophthalaldehyde, bis-4-formyl phenyl ester) in the presence of piperidine. Although the powders were insoluble in most of the solvents, they yielded weakly concentrated solutions with certain compounds which reacted with aldehyde groups of the polymer. The resulting polymers showed semiconductor properties: the electrical conductivity of a non-preheated sample (obtained from N-methyl lutidine iodide and terephthalaldehyde) was

Card 2/3

MAZEL', I.S.; VASIL'YEVA-SOKOLOVA, Ye.A.; KUDRYAVTSEV, G.I.

Cleavage of pyridine rings in  $\alpha$  - and  $\gamma$  -vinylpyridines and in  
polymers obtained from their monomers. Vysekom.soed. 5 no.6:868-872  
Je '63. (MIRA 16:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut iskusstvennogo  
volokna.

(Pyridine) (Pyridinium compounds)

VYSOKA-BURIANOVA, B.; BURIAN, V.; FLASAROVA, M.; GOSTOFF, R.; JANICEK, B.;  
MAZEL, J.; SKALICKOVA, J.; ZIMOLA, J.; technicka spoluprace F. Padour

Dynamics of trans-placental transfer of antibodies against  
pertussis and parapertussis. Cesk. epidem. mikrob. imun. 9 no.4:  
223-228 Je '60.

1. Katedra epidemiologie lekarske fakulty hygienicke KU v Praze,  
krajske ustavy narodniho zdravi a krajske hygienicko-epidemiologicke  
stanice v Liberci, Usti n. L., Jihlave a Olomouci.

(WHOOPING COUGH immunol.)

(PLACENTA physiol.)

(ANTIBODIES)

SERY, V.; STRAUSS, J.; SKVRNOVA, K.; PANTOVA, Z.; MAZEL, J.

Immunological review of ornithosis among the population of  
Czechoslovakian regions. Cesk.epidem.mikrob.imun.9 no.5/6:  
386-391 J1'60.

1. Ustav epidemiologie a mikrobiologie, Praha -- Krajska hygienicko-  
epidemiologicka stanice, Olomouc -- Okresni hygienicko-epidemiologicka  
stanice, Hranice.

(ORNITHOSIS immunol)

SERY, V.; STRAUSS, J.; FANTOVA, Z.; MAZEL, J.; VONDRACEK, V.

Immunological survey of ornithosis in the population of the Czech regions. J. hyg. epidem., Praha 5 no.4:439-443 '61.

1. Institute of Epidemiology and Microbiology, Prague.

(ORNITHOSIS immunol)

155T105

Mazel', K. B.

USSR/Radio - Vacuum Tubes  
Regulators

Nov/Dec 49

"Design of an Electronic Voltage-Regulating System  
With a Parallel-Connected Regulating Tube," K. B.  
Mazel', Engr, 5½ pp

"Radiotekhnika" No 6

Deduces relationships which determine degree of in-  
stability and internal resistance of electronic reg-  
ulator circuit with regulating tube connected in  
parallel, allowing for effect of dynamic resistance  
of gas stabilizer. Submitted 8 Jul 49.

155T105

MAZEL', K. B.

Tension rectifiers and stabilizers Moskva, Gos. energ. izd-vo, 1951. 119 p.  
(Massovaia radiobiblioteka, vyp. 111) (54-189(1))

TK9956.M37

PA 187T18

MAZEL, K. B.

USSR/Electricity - Voltage Regulators Jan/Feb 51

"Electronic Stabilizer With Wide Regulation of Output Voltage," K. B. Mazel'

"Avtomat i Telemekh," Vol XII, No 1, pp 89-95

Considers electronic voltage stabilizer circuit which permits smooth variation of voltage from zero to max and which possesses small int resistance. Gives relation for detg instability and int resistance of circuit, and determines dependence of instability of output voltage upon instability of basic and supplementary voltages. Submitted 10 Mar 50; resubmitted 12 Oct 50 after revision.

187T18



FD-1468

USSR/Electronics - Current stabilization

Card 1/1 : Pub 90-5/14

Author : Mazel, K. B. Active Member of VNOR1E

Title : ~~Calculation of an electronic current stabilizer~~  
Calculation of an electronic current stabilizer

Periodical : Radiotekhnika 9, 36-42, Sep/Oct 1954

Abstract : An analysis of the principles of operation and the method for calculation of a simple current stabilization circuit using beam tetrode 6PIP and two gas voltage stabilizers (SG1P, SG2S, SG3S, or SG4S). The influence of the screen grid current of the regulator tube is taken into account. An example of the calculation of the stabilizer and experimental curves are given. One reference: US Schematic diagram; table; graphs.

Institution : All-Union Scientific and Technical Society of Radio Engineering and Electric Communications imeni A. S. Popov (VNOR1E)

Submitted : December 19, 1953

'MAZEL', Klimentiy Borisovich; BROYDE, A.M., redaktor; BERG, A.I.,  
redaktor; DZHIGIT, I.S., redaktor; YELIN, O.G., redaktor; KULI-  
KOVSKIY, A.A., redaktor; MOZHZHEVELOV, B.N., redaktor;  
SMIRNOV, A.D., redaktor; TARASOV, P.I., redaktor; TRAMM, B.P.,  
redaktor; CHECKIK, P.O., redaktor; SHAMSHUR, V.I., redaktor;  
SKVORTSOV, V.M., tekhnicheskii redaktor

[Voltage and current stabilizers] Stabilizatory napriazhenia i  
toka. Moskva, Gos.energ.izd-vo, 1955. 133 p. (Massovaya radio-  
biblioteka, no.218) (MLRA 8:9)  
(Voltage regulators)

MAZEL, K.B.

Mazel', K.B., Candidate of Tech. Sciences

Teoriya i raschet vypryamitelya, rabotayushchego na yemkost', s  
uchetom induktivnosti rasseyaniya transformatora (Theory and Calcula-  
tion of a Rectifier With a Capacitive Load, Corrected for Leakage  
Inductance of the Transformer) Moscow, Gosenergoizdat, 1957, 39 pp.  
10,000 copies.

Ed.:

Akalunin, S.A.; Tech. Ed.: Voronin, K.P.

PURPOSE:

To present a simplified engineering calculation method  
in designing rectifier installations with a capacitive load

COVERAGE:

The author investigates the theory of the operation of a  
rectifier with a filter which has a capacitive response.  
He calculates the influence of resistance and of leakage  
inductance of the anode transformer. In order to simplify  
complicated formulae, the author reduced these formulae  
into a series of graphs. Simplified auxiliary relations

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Theory and Calculation of a Rectifier With a Capacitive Load (Cont.)

make it possible to find approximate values of resistance and reactance of the anode transformer. The divergence between the experimental and calculated data have been reduced to practically admissible values. The author thanks Prof. Tsykin, G.S. for frequent valuable advice and suggestions given him during his work. He mentions Prof. Aseyev, B.P. (p. 4) as the originator of the engineering method of calculating capacitively loaded rectifiers, Prof. Terent'yev, B.P. (pp. 5,6,26 and 27) and Prof. Tsykin, G.S. (p. 5) as those who further developed the method without, however, considering leakage inductance of the transformer. There are 15 references, of which 14 are Soviet and 1 is a translation.

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# Theory and Calculation of a Rectifier With a Capacitive Load (Cont.)

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MAZEL', K. B.

ROGINSKIY, Vladimir Yur'yevich; MAZEL', K.B., redaktor; MEDVEDEV, L.Ya.,  
tekhnicheskii redaktor

[Semiconductor contact rectifiers] Poluprovodnikovye vypriamiteli.  
Izd. 2-oe, perer. Moskva, Gos.energ.izd-vo, 1957. 94 p. (Massovaya  
radiobiblioteka, no.273) (MLRA 19:19)  
(Semiconductors) (Electric current rectifiers)

TERENT'YEV, Boris Petrovich,; MAZEL' A.K.B., otv. red.; NOVIKOVA, Ye.S., red.;  
MARKOCH, K.G., tekhn. red.

[Electric power supply for radio equipment] Elektropitanie radioustroystv.  
Izd. 2., perer. i dop. Moskva, Gos. izd-vo lit-ry po voprosam  
svyazi i radio, 1958. 239 p. (MIRA 11:12)  
(Radio--Current supply)  
(Radio--Equipment and supplies)

MAZEL, K B

PHASE I BOOK EXPLOITATION

SOV/4993

Zhuravlev, Anatoliy Andreyevich, and Klimentiy Borisovich  
Mazel'

Preobrazovateli postoyannogo napryazheniya na tranzistorakh  
(Transistorized D-C Converters and Inverters) Moscow,  
Gosenergoizdat, 1960. 77 p. 62,000 copies printed.  
(Series: Massovaya radiobiblioteka, vyp. 357)

Editorial Board: Berg, A. I., Burdeynyy, F. I., Burlyand,  
V. I., Vaneyev, V. I., Genishta, Ye. N., Dzhigit, I. S.,  
Kanayeva, A. M., Krenkel', E. T., Kulikovskiy, A. A.,  
Smirnov, A. D., Tarasov, F. I. and Shamshur, V. I.; Ed.:  
P. A. Popov; Tech. Ed.: N. I. Borunov.

PURPOSE: This booklet is intended for radio amateurs  
acquainted with semiconductor devices.

COVERAGE: The booklet examines basic problems related to the  
operation and design of the more commonly used transistor-  
ized converter and inverter systems. The booklet contains  
data on numerous semiconductor and some electric vacuum

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Transistorized D-C (Cont.)

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devices which are used in the converter and inverter systems. Ch. IV. reviews certain circuits which make it possible to use the converters not only for voltage conversion but also for other purposes. Ch. I. was written by A. A. Zhuravlev, and chs. II, III, and IV by K. B. Mazel'. No personalities are mentioned. There are 9 references, all Soviet (including 1 translation from English).

TABLE OF CONTENTS:

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1. Types of converters and inverters	5
2. Basic types of transistorized converters	8
3. Transistorized master oscillator circuits	10
4. Rectifier circuits	13

Card 2/4

MAZEL', K.B.

Use of cathode-balanced amplifiers in electronic voltage stabilizers. Elektrosviaz' 14 no.9:20-25 S '60. (MIRA 13:9)  
(Voltage regulators) (Amplifiers, Electron-tube)

MAZEL', K.B.

Electronic filters for rectifying devices. Elektrosviaz'

16 no.5:41-49 My '62.

(MIRA 15:5)

(Electric filters)

(Electric power supply to apparatus)

S/108/62/017/004/009/010  
D288/D301

9.2530

AUTHOR: Mazel', K.B., Member of the Society (see Association)

TITLE: Calculation of stabilization performance of magnetic  
d.c. voltage and current stabilizers

PERIODICAL: Radiotekhnika, v. 17, no. 4, 1962, 61 - 65

TEXT: After a brief explanation of the principle of a magnetic stabilizer -- feedback information from output voltage or current is compared after d.c. amplification with a reference potential and drives a power amplifier loaded by the control winding of a saturable reactor, of which the main - a.c.-winding is in the transformer primary circuit -- formulas are derived for the anode current of the power amplifier, the voltage across transformer primary, voltage stabilization coefficient (d.c. voltage to mains input), current stabilization coefficient (d.c. current to mains input) and for the relevant output impedances in terms of amplifier mutual conductance, impedance and load, reactor resistance in the linear zone and rectifier impedance. General qualitative conclusions are drawn, indicated ✓  
B

Card 1/2

Calculation of stabilization ...

S/108/62/017/004/009/010  
D288/D301

ing the effects of above characteristics on the performance and operational stability of the circuit. As the phase shift between reactor and transformer is neglected and linear characteristics are assumed throughout, the above formulae supply approximate values only. There are 3 figures.

ASSOCIATION: Nauchno-tekhnicheskoye obshchestvo radiotekhniki i elektrosvyazi imeni A.S. Popova (Scientific and Technical Society of Radio Engineering and Electrical Communications, imeni A.S. Popov) [Abstractor's note: Name of Association taken from first page of journal]

SUBMITTED: June 6, 1961  
December 12, 1961 (after revision)

Card 2/2

MAZEL', K.B.

Fundamental relationships for calculating rectifiers fed by square a.c. voltage pulses. Elektrosviaz' 17 no.10:66-73 0 '63. (MIRA 17:1)

ZHURAVLEV, Anatoliy Andreyevich; MAZEL', Klimentiy Borisovich;  
POPOV, P.A., red.

[Transistorized d.c. voltage converters] Preobrazovateli  
postoiannogo napriazheniia na tranzistorakh. Izd.2., perer.  
Moskva, Energiia, 1964. 93 p. (Massovaia radiobiblioteka,  
no.547) (MIRA 18:2)

MAZEL<sup>0</sup>, L.

Price levels at collective farm markets in cities. Sov. targ. no.9:  
11-17 S '56. (MLRA 9:11)

1. Starshiy nauchnyy sotrudnik Nauchno-issledovatel'skogo instituta  
torgovli i obshchestvennogo pitaniya.  
(Farm produce--Marketing) (Prices)



MAZEL, L.; ZELINKA, M.

Mechanical purifications of waste water from dairies.

p. 51  
Vol. 5, no. 1/2, Mar. 1955  
VODNI HOSPODARSTVI  
Praha

SO: Monthly List of East European Accessions (EEAL), LC, Vol. 5, no. 3  
March 1956

MAZEL, L.

"Control of distillation for the purpose of determining nitrogen by Kjeldahl's method." p.168

VODNI HOSPODARETVL (Ustredni sprava vodniko hospodarstvi) Praha, Czechoslovakia,  
no. 4, April, 1959

Monthly List of East European Accessions (EEAI) LC, Vol. 8, No. 6, June 1959

Uncl.

MAZEL' L. G.

PA 22/49T25

USSR/Engineering  
Concrete  
Blocks

Oct 48

"Modernized Typical Factories for the Production  
of Slag-Concrete Blocks," L. G. Mazel', Engr,  
2<sup>1</sup>/<sub>2</sub> pp

"Mekh Stroi" No 10

Mass production of slag-concrete blocks began  
in USSR from 1944-1947. By 1948, production was  
350 million blocks or 2.25 billion bricks. Dis-  
cusses factory design. Includes six diagrams,  
and three tables.

22/49T35

MAZEL, M.

Task of the leading accountant of the machine-tractor station in  
introducing business accounting in a tractor brigade. p.305

MECHANISACE ZEMEDELSTVI. (Ministerstvo zemedelstvi) Praha

Vol. 5, no. 16, Aug. 1955

East European Accessions List

Vol. 5 No. 1

Jan. 1956

MAZEL, M.

Mechanized harvesting of hops and its economic evaluation. p.49.  
SBORNIK. RADA ZEMEDELSKA EKONOMIKA, Prague, Vol. 29, no. 1, Jan. 1956.

SO: Monthly List of East European Accessions, (EAL), LC, Vol. 5, No. 6 June 1956, Uncl.

ABRAMOVA, N.A., nauchn. sotr.; VOYEVOVSKIY, A.S., nauchn. sotr.;  
GINZBURG, O.F., doktor khim. nauk; YERSHOVA, Ye.TS., kand.  
khim. nauk; KOLYCHEV, V.B., nauchn. sotr.; MAR'YANOVSKAYA,  
K.Yu., nauchn. sotr.; MAZEL', R.L., nauchn. sotr.;  
MEL'NIKOVA, N.S., nauchn. sotr.; PLATUNOVA, N.B., nauchn.  
sotr.; REMOZOV, A.L., kand. khim. nauk; UTOCHKIN, V.V.,  
nauchn. sotr.; KHAVIN, Z.Ya., kand. khim. nauk; EFROS, L.S.,  
doktor khim. nauk; NIKOL'SKIY, B.P., glav. red.; RABINOVICH,  
V.A., kand. khim. nauk, zam. glav. red.; GRIGOROV, O.N.,  
doktor khim. nauk, red.; POZIN, M.Ye., doktor tekhn. nauk,  
red.; PORAY-KOSHITS, B.A., doktor khim. nauk, red.;  
RACHINSKIY, F.Yu., kand.khim. nauk, red.; ROMANKOV, P.G.,  
doktor tekhn. nauk, red.; FRIDRIKHSBERG, D.A., kand. khim.  
nauk, red.; ZONIS, S.A., red.; LEVIN, S.S., tekhn. red.;  
ERLIKH, Ye.Ya., tekhn. red.

[Handbook of chemistry] Spravochnik khimika. 2. izd., perer.  
i dop. Leningrad, Goskhimizdat. Vol.2. [Basic properties of  
inorganic and organic compounds] Osnovnye svoistva neorgani-  
cheskikh i organicheskikh soedinenii. 1963. 1167 p.  
(MIRA 17:3)

1. Chlen-korrespondent AN SSSR (for Nikol'skiy).

96-1-10/31

AUTHOR: Mazel', R.Ye., Engineer

TITLE: On the Influence of Widmanstätten Structure on the Properties of Low-carbon Boiler Steel (O vliyanií vidmanshtetovoy struktury na svoystva kotel'noy malouglerodistoy stali)

PERIODICAL: Teploenergetika, 1958, Vol.5, No.1, pp. 37 - 40 (USSR).

ABSTRACT: Widmanstätten structure is often formed in carbon steel. Until recently, this structure was considered defective and impermissible but there were no mechanical test data to support this view. The formation of Widmanstätten structure is practically unavoidable in welds in high-pressure boilers and, therefore, the influence of this structure on the strength and reliability of boiler steels was studied at the Institute. Photomicrographs typical of Widmanstätten structure near different kinds of welded joint are given in Fig. 1. To study the conditions of formation of the structure, an investigation was made into the temperature distribution in the metal during welding operations on pipework. It emerged that the separation of acicular ferrite is caused by heating above the  $AC_3$  point on the iron-carbon diagram and cooling in the temperature range 900 - 600 °C at the rate of 25 - 50 °C per second. Heat treatment conditions were found that promoted the formation of

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96-1-10/31

On the Influence of Widmanstätten Structure on the Properties of Low-carbon Boiler Steel.

Widmanstätten structure. The properties of the metal were studied on welds and also on heat-treated specimens with a marked Widmanstätten structure analogous with that obtained by welding. The influence of the Widmanstätten structure was determined by comparison with the properties of annealed normalised and tempered metal at temperatures between 20 and 500 °C. Tests were made on 6 melts of low carbon steel with carbon contents in the range 0.15 - 0.25%. Ultimate-strength and yield-point determinations showed that low-carbon steel with Widmanstätten structure has the greatest strength. Ultimate-strength curves against temperature are given in Fig.2. Steel with Widmanstätten structure has a 40% higher ultimate strength and a 60% higher yield-point than annealed steel. Curves of impact strength and strain characteristics assume maximum values at temperatures of 100 - 200 °C and minimum values at 500 °C. The results, given in Fig.3, show that the impact strength of low-carbon steel with Widmanstätten structure is high.

Tests were made to assess sensitivity to notching, using samples Card2/4 800 mm diameter with a notch of 0.1 mm radius, 1 mm deep. The



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On the Influence of Widmanstätten Structure on the Properties of Low-carbon Boiler Steel.

results, given in Fig.4, show that steel with Widmanstätten structure is particularly sensitive to notching. Investigations were made on the creep, long-term strength and fatigue properties of steel with Widmanstätten structure. In 5 000 hour tests at 500 °C, the creep rate was only half that of steel with annealed structure. In long-term strength tests at 500 °C, the time to failure is one-and-a-half times as great (see Fig.5). Fatigue-limit data are tabulated and show that the presence of Widmanstätten structure increases the fatigue limit by 10 - 45%. The fatigue curves show less resistance to overloading than annealed steel. Because of the severe conditions to which welded joints are exposed in power stations it was decided to make full-scale tests on 500 joints made by gas, arc and contact welding. The tests were made in an experimental turbine heater at 110 °C and 110 atm. and on an economiser rig at the All-Union Thermo-technical Institute. The temperature ranged cyclically from 300 - 150 °C at a pressure of 130 atm. Failure occurred only in defective joints. Properly made welded joints with Widmanstätten structure operated reliably in the experimental heater for 6000 hours during which they underwent 30 000 cycles. The

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On the Influence of Widmanstätten Structure on the Properties of  
Low-carbon Boiler Steel.

laboratory and operational test results showed that welded joints of low-carbon steel with Widmanstätten structure can operate reliably in boiler installations at temperatures between 20 and 500 °C. As a result of the work, the State Boiler Inspectorate has excluded from the new rules for pressure vessels and pipework the prohibition of Widmanstätten structure. There are 5 figures and 7 Slavic references.

ASSOCIATION: VTI

AVAILABLE: Library of Congress.

Card 4/4

S/137/62/000/005/130/150  
A160/A13:

AUTHOR: Mazel', R. Ye.

TITLE:

The structure and properties of welded joints of main superhigh-parameter steam pipes from 1X18H12T (1Kh18N12T) steel prior to and after the austenitizing process

PERIODICAL:

Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 15, abstract 1760  
(V sb. "Ekspluatats. nadezhnost' metalla parosilovykh ustanovok".  
Moscow - Leningrad, Gosenergoizdat, 1959, 22 - 34)

TEXT:

Investigations were carried out of the structure and the properties of welded joints of pipes having a diameter of 219 x 27 mm and made from 1Kh18N12T steel. The welding and the subsequent thermal treatment were conducted at a GRES of superhigh parameters according to effective instructions on the assembly of the main superhigh-parameter steam pipe. During the thermal treatment (austenitization), the heating temperature in the electric clutch was 1,050°C, and the holding time - 1 hour. The welding was carried out with UT-15 (TsT-15) electrodes, and TsT-15-1 electrodes were used for the first layer. Conclusions:

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The structure and properties of...

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A160/A101

1) The austenitization at 1,050°C used under assembly conditions does not essentially change the original structure. 2) The  $\sigma_b$  of welded joints equals 57 kg/mm<sup>2</sup> prior to and after the austenitization at 1,050°C. 3) The ductility and  $a_k$  at 20°C for the fused-on metal decreases by about 25% after austenitization at 1,050°C. 4) The built-up metal has the highest sensitivity to notches. After austenitization at 1,050°C, the welded joints possess a higher tendency to brittle failure, which may be determined by the degree of ductility in the notch. 5) The austenitization at 1,050°C does not lead to an increase of the heat-resistant properties of welded joints. The durability of pieces from an austenitized industrial seam is 2 - 3 times lower than that of a seam which was thermally not treated. 6) During the initial aging stages at 600°C, a segregation of carbides was noted in welded joints prior to and after the austenitization. The carbides were mainly noted along the boundaries of the grains. During all the stages of aging lasting 8,000 hours, the presence of  $\sigma$  phases in the seam metals and of heat-affected zones was observed. Hereby, the fused-on metal and the zones of thermal action at working temperature have the values  $a_k > 7.5$  kg/mm<sup>2</sup>. 7) The austenitization (at 1,050°C) of welded joints of assembled steam pipes may lead to failure and is dangerous in case the stresses are  $> 3.5$  kg/mm<sup>2</sup>. Tests

Card 2/3

The structure and properties of...

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Al60/Al01

carried out on the long-life strength during the process of austenitization revealed that a failure of welded joints arises in the course of 1-hour holding at 1,050°C and  $\sigma \rightarrow 3.5 \text{ kg/mm}^2$ .

V. Tarisova

[Abstracter's note: Complete translation]

Card 3/3

S/137/62/000/005/135/150  
A160/A101

AUTHORS: Vidman, D. N., Mazel', R. Ye.  
TITLE: Brittle failures, the structure and the properties of welded joints  
of high-pressure pipelines

PERIODICAL: Referativnyy zhurnal, Metallurgiya, no. 5, 1962, 21, abstract 5097  
(V sb. "Ekspluatats. nadezhnost' metalla parosilovyykh ustanovok".  
Moscow-Leningrad, Gosenergoizdat, 1959, 49 - 61)

TEXT: Investigated were the structure and the properties of welded joints  
of high-pressure pipelines, made from grade 20 and 15 XM (15KhM) steels. To  
test the welded joints, analyzed were the structural heterogeneity, internal  
residual welding stresses, the sensitivity of the metal to notches and the fa-  
tigue strength. The following conclusions are drawn: 1) The failures of welded  
joints of pipelines in high-pressure power installations are of brittle-type.  
2) These failures, during the initial operational period, are caused by a poor  
quality of welding. After a long operational period, the failures are due not  
only to the seam defects - but to the corrosion action of the medium, the effect

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A160/A101

Brittle failures,...

of uncompensated stresses, pulsation of temperatures and pressures, and also to an increased vibration. 3) A considerable difference between the heating temperatures and the rates of cooling the metal during the welding of pipes leads to a great structural heterogeneity. The formation of a Widmanstätten pattern is characteristic of the welded joints of pipes made from 15-20-grade carbon steels. Ferrite-perlite structures with a "radiant texture" will develop in the welded joints of steam pipes from 15 KhM steel. 4) Investigations conducted on butts of steam pipes made from perlite steel and welded by the technology used under assembly conditions warranted a conclusion that the welded joints which had not been subjected to thermal treatment possessed reduced ductile properties. 5) It was detected that the welded joints which had not been thermally treated had an increased tendency to brittle failure. The highest sensitivity to notches possesses the fused-on metal. 6) The maximum residual tensile stresses ( $\sigma_{resid}$ ) in steam-joints attain the level  $\sigma_s$  and are located in the built-up metal at a depth of 10 mm. In the zones of the thermal effect the maximum stresses are on the pipe surface. 7)  $\sigma_{resid}$  form an asymmetric cycle during alternating loads and reduce about twice the cyclic strength of welded joints. 8) A high tempering of welded joints of steam pipes from perlite steel leads to a relaxa-

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Brittle failures,...

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A160/A101

tion of ~90% of the internal welding stresses, increases the bend angle about two times and decreases the tendency to brittle failure. The operational reliability of welded joints of steam pipes from perlite steel increases after high tempering. There are 8 references.

V. Tarisova

[Abstracter's note: Complete translation]

Card 3/3



SOV/96-59-10-7/22

AUTHORS: Vidman, D.N., and Mazel', R.Ye. (Engineers)

TITLE: Faults in Welded Joints of High-pressure Steam Piping,  
and their Notch-sensitivity

PERIODICAL: Teploenergetika, 1959, Nr 10, pp 39-43 (USSR)

ABSTRACT: Many faults in welded joints on high-pressure steam piping in power stations have been revealed by ultrasonic methods. It was accordingly decided to study such faults and to make special tests of notch-sensitivity at high temperatures and under various conditions of stress. The tests were made on damaged welded joints in main steam pipes made of steel grade 15KhM obtained from power stations and also on experimental welds on pipes of 273x27 mm diameter welded under practical conditions with electrodes grade TsL-14. The properties of the joints were studied both before and after tempering at a temperature of 680-710°C. The damaged joints were sectioned and ground to reveal cracks and voids formed by poor penetration, as photographed in Figs 1 and 2. Polar diagrams of damaged joints of the type shown in Fig 3 were constructed, as a means of analysing the development of cracks from the root of the welds. Most of the cracks took place across

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Faults in Welded Joints of High-pressure Steam Piping, and their  
Notch-sensitivity

the crystals and some were filled with oxide; as photographed in Fig 4. In many cases, the edges of the crack are decarbonised to a depth of several grains; see for example, Fig 5. The analysis showed that failures were of a brittle character starting from places of local stress concentration at the root of the weld. The notch-sensitivity was first studied by short-term static tensile tests, carried out over the temperature range of 20-500 °C. The criterion of evaluation was plasticity of the metal in the notch. The radius of the bottom of the notch was made 0.3 mm and the angle 47 degrees. Tests were made both in the weld and in the main metal and the results are given in Table 1 and in Fig 6. Great variations were found in the properties of the weld metal, particularly if it had not been tempered. The notches used in the tests were not so sharp as natural cracks and there is an obvious risk of sharp cracks developing during the starting-up period at intermediate temperatures around 300 °C. The influence of static load on the notch-sensitivity was also studied in long-term tests. The tests were made at temperatures of 540 °C and

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Faults in Welded Joints of High-pressure Steam Piping, and their  
Notch-sensitivity

various stresses ranging from 24 to 32 kg/mm<sup>2</sup>. The results are given in Table 2 and show that in general the time to failure is longer in welds that have not been heat-treated. In tests lasting more than 2000 hours tempering is found to give improved performance. Dynamic loads are also applied to piping during erection and operation. Accordingly dynamic tests of notch-sensitivity were made, using specimens of 10 x 10 x 55 mm made from welded joints taken from pipes. Specimens with artificial notches and natural cracks were both tested. The results obtained were used to plot the volumetric diagrams of variations in impact strength of welded joints given in Fig 7. In heat-treated welded joints subjected to bending stresses greater than 10 kg/mm<sup>2</sup> at room temperature the metal of the zone of melting has a lower damping capacity than the weld metal; at a temperature of 500 °C the position is reversed. The beneficial effect of tempering in reducing the notch-sensitivity is largely to be explained by changes in the structural conditions and relaxation of internal stresses.

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Faults in Welded Joints of High-pressure Steam Piping, and their  
Notch-sensitivity

Analysis of stresses in piping show that the maximum normal stresses due to internal pressure, which are of the order of 4 kg/mm<sup>2</sup>, are not specially dangerous in magnitude or direction. Apparently the development of cracks is mainly associated with dynamic and additional thermal and uncompensated loadings that occur when pipes are not free to move as they expand. Overloading may also be caused by wrong spacing of the supports, because the pipes then bear too much of their own weight. Inspection of a large number of welded joints in various high-pressure power stations has shown that they are quite reliable if they are properly made, correctly heat-treated and operated under normal conditions.

Card 4/4

There are 8 figures, 2 tables and 5 references, of which 3 are Soviet and 2 English.

ASSOCIATION: All-Union Thermo-Technical Institute (Vsesoyuznyy  
teplotekhnicheskiy institut)